

AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

Free-air temperatures were above normal at all levels at all stations. (Table 1.) Practically all of the departures were very large, except Due West.

Free-air relative humidities were below normal at all levels at Due West and Royal Center and in the upper levels at Groesbeck. At Broken Arrow and Ellendale they were above normal at most levels.

Free-air vapor pressures were above normal at all levels at Broken Arrow, Ellendale, and Royal Center and in the lower levels at Groesbeck. At Due West and in the upper levels at Groesbeck they were below normal.

From the surface to the 1,500 meter level the free-air resultant winds were variable. Above this level they were westerly. (Table 3.)

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during February, 1930

TEMPERATURE (°C.)										
Altitude m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	De- parture from normal	Mean	De- parture from normal	Mean	De- parture from normal	Mean	De- parture from normal	Mean	De- parture from normal
<i>Meters</i>										
Surface.....	10.3	+5.4	8.4	+0.3	-3.1	+6.6	13.7	+3.9	3.3	+4.8
500.....	10.3	+6.5	8.6	+1.4	-3.3	+6.4	12.6	+4.0	1.8	+5.3
1,000.....	8.9	+5.9	6.8	+1.2	-1.8	+6.8	12.0	+3.7	0.2	+4.7
1,500.....	7.2	+5.1	4.6	+0.9	-2.3	+5.8	10.4	+3.3	-1.6	+3.8
2,000.....	4.8	+4.3	2.5	+0.7	-4.8	+4.7	8.5	+3.4	-3.6	+3.2
2,500.....	2.0	+3.8	0.3	+0.9	-7.7	+4.1	6.3	+3.6	-5.6	+3.1
3,000.....	-1.0	+3.4	-2.4	+0.6	-10.6	+3.9	3.7	+3.4	-8.5	+2.7
4,000.....	-7.4	+2.2	-7.1	+1.5	-17.6	+2.2	-0.1	+4.4	-15.2	+2.0
5,000.....					-25.2	+0.4				

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during February, 1930—Continued

RELATIVE HUMIDITY (%)										
Altitude m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	De- parture from normal	Mean	De- parture from normal	Mean	De- parture from normal	Mean	De- parture from normal	Mean	De- parture from normal
<i>Meters</i>										
Surface.....	70	+1	66	-3	83	+2	78	+4	76	-2
500.....	65	-1	56	-8	82	+2	75	+7	75	-3
1,000.....	57	0	50	-10	66	-4	77	-1	69	-1
1,500.....	49	-2	46	-10	58	-4	47	-4	59	-3
2,000.....	47	+1	45	-9	59	0	37	-9	52	-4
2,500.....	50	+6	43	-9	63	+4	28	-16	50	-4
3,000.....	49	+6	40	-9	64	+6	28	-14	55	0
4,000.....	57	+16	32	-14	70	+15	14	-23	46	-11
5,000.....					76	+18				

VAPOR PRESSURE (mb.)										
Surface.....	9.22	+2.98	7.93	-0.06	4.33	+1.74	12.47	+2.98	6.41	+1.89
500.....	8.32	+2.84	7.06	-0.01	4.21	+1.67	11.16	+3.02	5.71	+1.78
1,000.....	6.83	+2.44	5.58	-0.47	3.49	+1.17	7.95	+1.35	4.74	+1.52
1,500.....	5.18	+1.60	4.28	-0.61	2.91	+0.84	5.61	+0.46	3.67	+1.13
2,000.....	4.11	+1.29	3.40	-0.66	2.42	+0.69	3.53	-0.48	2.53	+0.52
2,500.....	3.58	+1.26	2.52	-0.49	2.02	+0.60	2.21	-1.03	1.94	+0.28
3,000.....	2.85	+0.96	1.74	-0.54	1.59	+0.48	1.69	-0.99	1.78	+0.44
4,000.....	1.99	+0.68	0.48	-0.70	0.68	+0.01	0.19	-1.57	1.38	+0.55
5,000.....					0.34	-0.04				

TABLE 3.—Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during February, 1930

Altitude (meters) m. s. l.	Broken Arrow, Okla. (233 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,868 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (65 meters)		Key West, Fla. (11 meters)		Los Angeles, Calif. (40 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Surface.....	S 6 W	3.0	S 13 W	1.4	N 84 W	6.2	S 23 W	0.5	N 69 W	3.0	S 14 E	0.5	S 53 W	2.6	N 12 E	1.2	N 75 E	2.5	N 81 W	2.0
500.....	S 17 W	7.2	S 53 W	3.1			S 77 W	3.0	N 68 W	4.4	S 29 W	5.8			S 40 E	1.3	S 85 E	6.0	N 71 E	0.7
1,000.....	S 45 W	7.2	N 58 W	6.1			S 83 W	4.3	N 55 W	10.0	S 45 W	4.9	S 69 W	7.5	S 26 W	1.8	S 70 E	5.4	N 2 E	0.4
1,500.....	S 63 W	6.6	N 59 W	9.7			S 88 W	6.8	N 65 W	10.9	S 72 W	1.5	W	10.2	S 79 W	3.5	S 56 E	3.0	N 59 W	1.6
2,000.....	S 81 W	7.9	N 46 W	12.1	N 83 W	9.7	N 86 W	8.5	N 63 W	12.5	S 81 W	2.2	N 82 W	12.3	N 83 W	4.5	S 23 E	1.5	N 41 W	2.5
2,500.....	N 86 W	9.5	N 51 W	11.6	N 74 W	13.9	W	10.5	N 70 W	13.8	N 50 W	3.1	N 78 W	12.7	N 78 W	5.2	S 27 W	1.9	N 46 W	3.4
3,000.....	S 87 W	8.9	N 51 W	12.7	N 67 W	13.6	N 84 W	11.4	N 67 W	14.1	N 63 W	5.4	N 83 W	10.4	N 77 W	8.1	N	0.6	N 37 W	4.5
4,000.....			N 67 W	12.2	N 59 W	7.1	N 75 W	11.6	N 60 W	16.6	N 87 W	11.6	S 87 W	6.6	N 80 W	10.3	N 72 W	5.2	N 50 W	6.8
5,000.....							N 80 W	13.6							N 86 W	11.6	N 74 W	8.0		

Altitude (meters) m. s. l.	Medford, Oreg. (446 meters)		Memphis, Tenn. (145 meters)		New Orleans, La. (25 meters)		Omaha, Nebr. (313 meters)		Royal Center, Ind. (225 meters)		Salt Lake City, Utah (1,280 meters)		San Francisco, Calif. (60 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (67 meters)		Washington, D. C. (34 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Surface.....	S 33 E	0.2	S 13 W	1.7	N 54 E	1.2	S 48 W	0.3	S 59 W	2.0	S 27 E	2.5	S 33 E	1.3	N 39 E	0.6	S 24 E	1.6	N 63 W	0.7
500.....	S 55 W	0.4	S 59 W	5.7	S 68 E	2.9	S 75 W	3.5	S 65 W	6.6			S 52 W	2.0	N 60 E	2.4	S 9 W	6.0	N 86 W	6.3
1,000.....	S 13 W	2.6	S 82 W	5.0	S 9 E	1.2	N 81 W	7.7	S 86 W	9.8			N 24 W	4.6	N 35 W	2.2	S 9 W	7.0	N 72 W	8.5
1,500.....	S 47 W	5.6	N 81 W	5.5	S 51 W	2.9	N 75 W	9.0	N 80 W	9.2	S 7 E	4.9	N 28 W	4.6	N 76 W	4.6	S 29 W	7.6	N 80 W	11.0
2,000.....	S 61 W	7.2	N 78 W	5.4	S 85 W	3.8	N 75 W	10.2	N 86 W	11.8	S 24 W	4.2	N 34 W	4.4			S 78 W	7.0	N 76 W	12.1
2,500.....	S 73 W	9.7	N 88 W	7.3	S 86 W	5.3	N 88 W	11.1			S 79 W	4.4	N 56 W	4.0			N 84 W	3.2	N 80 W	11.9
3,000.....	S 86 W	10.0	S 78 W	6.2	S 85 W	5.3	N 80 W	12.7			N 86 W	6.8	N 68 W	4.9			N 70 W	6.8	N 85 W	13.9
4,000.....	N 68 W	9.0									N 86 W	8.3								

TABLE 2.—Free air data determined at naval air stations during February 1930

Altitude (meters) m. s. l.	Temperature (° C.)			Relative humidity (%)		
	Pensa- cola, Fla.	San Diego, Calif.	Wash- ington, D. C.	Pensa- cola, Fla.	San Diego, Calif.	Wash- ington, D. C.
Surface.....	11.8	14.8	3.3	84	72	73
500.....	12.5	14.1	3.4	64	61	66
1,000.....	10.4	13.8	2.3	64	50	60
2,000.....	5.6	9.3	-1.5	58	35	55
3,000.....	0.9	5.2	-5.8	44	24	47
4,000.....			-13.1			53

TABLE 4.—Observations by means of kites, captive and limited-height sounding balloons during February, 1930

	Broken Arrow, Okla.	Due West, S. C.	Ellen- dale, N. Dak.	Gros- beck, Tex.	Royal Center, Ind.
Mean altitudes (meters) m. s. l., reached during month.....	2,808	2,617	2,957	2,418	2,611
Maximum altitude (meters) m. s. l., reached and date.....	4,439	4,359	5,107	4,172	4,531
Number of flights made.....	32	30	28	26	29
Number of days on which flights were made.....	27	28	28	22	27

¹ 17th. ² 22d. ³ 3d. ⁴ 8th. ⁵ 21st.
In addition to the above there were approximately 125 pilot balloon observations made daily at 53 Weather Bureau stations in the United States.

WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By P. C. DAY

GENERAL SUMMARY

The outstanding feature of the weather of the month was the remarkable warmth that prevailed over most portions of the country from about the 18th to 25th. Springlike weather prevailed to an unusual extent on a number of days during this period, and temperatures above any previously recorded in February were reported by some stations on several successive dates, a most unusual occurrence; also the extremes were in many cases a number of degrees higher than previously recorded.

Aside from the temperature abnormalities referred to, the weather elements were mainly not unusual.

PRESSURE AND WINDS

At the beginning of February high pressure existed in the central Plateau region, but without attendant cold; in fact warmer weather prevailed over most districts, a condition that may be expected with the entrance of an anticyclone into the United States at such a low latitude, and moderate temperatures continued for several days, save that a movement of high pressure southward from Hudson Bay toward New England brought sharp changes to cooler by the 4th in New England and the adjoining Maritime Provinces of Canada. At the same time low barometric pressure prevailed along the northern border with local precipitation at many points. By the 4th low barometric pressure had moved to the lower Mississippi Valley, and heavy rains had overspread near-by areas. This storm moved off the southern New England coast by the following morning, and was quickly followed by another low-pressure area moving into the Lake region, with attending light snow in the northern Plains and to the eastward. In the meantime the high pressure over the Plateau had remained nearly stationary, attended by generally fair conditions, and much colder weather had overspread New England and near-by areas in both the United States and Canada, temperatures of 50° or more below zero being reported from the interior of the Province of Quebec, though this cold was quickly followed by decided warmth over the same area.

By the morning of the 9th the anticyclone that had remained over the Plateau had been reinforced by an area of high pressure from the Pacific Northwest and was central over the northern Rocky Mountain region, attended by sharp changes to lower temperatures in that region, but there was considerable warming to the eastward with falling pressure and some snow over the Lake region, the cyclonic conditions moving into the St. Law-

rence Valley by the 10th; and light snow continued over portions of the Great Lakes, turning to light rain over small areas to the southward.

On the 11th there was considerable warming up from the central Rocky Mountains northeastward over the Dakotas and near-by areas in Canada, but lower temperatures prevailed in most northern districts from the Great Lakes eastward. By the following day there were three important temperature changes progressing along the northern border; the warm area of the 11th had moved eastward to the Great Lakes, extending southward to the northern part of the Gulf States, while the cold area to the eastward had moved to New England, and a new cold wave had developed in the upper Missouri Valley and to the northward, where changes from 20° to 40° colder were noted. Similar conditions existed during the 13th, the several areas having moved eastward in their respective orders, though the cold in the Northwest extended its area materially, while the similar area of cold over the Northeast had practically passed into the North Atlantic. During this period considerable precipitation occurred along the northern border from the Pacific eastward to near the Atlantic coast, with some snow at scattered points in the northern portions. On the 14th precipitation continued at scattered points somewhat further south than on the previous day, and it became rather general over the eastern section from the Gulf States northeastward to New England, with more or less snow, particularly from the Dakotas eastward into New England, where, near the coast, the precipitation became comparatively heavy.

There was scattered precipitation in east-central districts on the 15th, mostly snow, which continued over the coast districts on the following day, the snow turning to rain in the central and southern sections. This precipitation area was followed on the 16th by much warmer weather over the northern districts between the Mississippi River and the Rocky Mountains, and this warmth gradually moved toward the Atlantic coast during the following two days.

By the 19th anticyclonic conditions had become established over most southern districts, and high temperatures prevailed in practically all of the country, continuing with some local interruptions into the middle of the third decade, when precipitation set in over many central districts followed by changes to cooler over the interior portions, the lower temperatures moving eastward in the wake of the precipitation area that was advancing from the central valleys on the 26th and 27th. By the morning of the 27th low barometric pressure had moved into the central Plateau region attended by local snows at the higher elevations, and during the following day advanced